OMB Approval No. 2700-0087

National Aeronautics and Space Administration
NASA Headquarters
Exploration Systems Mission Directorate
Advanced Capabilities Division
300 E ST SW
Washington, DC 20546-0001

Research Opportunities in Combustion Science

NASA Research Announcement
Soliciting Proposals for the Period Ending August 18, 2009

Catalog of Federal Domestic Assistance (CFDA) Number: 00.000

NNH09ZTT001N NRA
Issued: May 18, 2009
Notices of Intent Due: June 18, 2009
Proposals Due: August 18, 2009

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Proposals that do not conform to the standards outlined in this solicitation may be declared noncompliant and declined without review. You must read and understand this solicitation in its entirety to prepare a competitive proposal. Key requirements are identified here:

- You and your organization must be registered with NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES). Your proposal must be submitted by an authorized representative of your organization. All team members listed on the proposal must be registered with NSPIRES (Section IV.B.1.a).
- Your hypothesis and specific aims must address the research emphases in this solicitation, and must be clearly outlined in the project description of your proposal (Section I.B).
- The length of the project description of the proposal cannot exceed 20 pages using standard (12 point) type (Section IV.B.1.c.1).
- Your proposal must meet requirements of the Compliance Review section of this solicitation (Section V.A).

I. Funding Opportunity Description

A. Introduction

This National Aeronautics and Space Administration (NASA) Research Announcement (NRA) solicits hypothesis-driven research proposals to conduct investigations in material flammability, combustion and fire detection in microgravity and reduced gravity environments. This call is for ground-based research that may eventually lead to research on the International Space Station (ISS). Because some of the selections may be considered for a future flight experiment, the proposers are encouraged to show a clear path from the proposed ground-based research to an experiment that can be feasibly conducted on the ISS using facilities either planned for the future or currently on ISS, such as the Combustion Integrated Rack, Microgravity Science Glovebox. For more information, please see http://exploration.grc.nasa.gov/Advanced/ISSResearch/. If the research selected in this NRA does eventually lead to an ISS experiment it is envisioned that a single insert will be designed and built to accommodate all investigators selected and will be conducted in the Combustion Integrated Rack (see O'Malley *et al.*, 2008 for information on capabilities of Combustion Integrated Rack).

Proposals submitted in response to this NRA must address the research emphases defined in Section B and are expected to provide evidence of a firm justification for the need of a microgravity environment. The ultimate goal of the research is to provide increased understanding of the fundamentals of fire behavior in reduced gravity including ignition, flame growth and spread, gaseous and particulate fire signatures, and fire suppression. If proposers plan to use NASA's ground-based low-gravity facilities such as the 2.2 Second Drop Tower, 5.2 Second Zero Gravity Facility or Low-gravity Aircraft

(http://microgravity.grc.nasa.gov/ground/), proposers must provide information on their expected use of these facilities as part of their project description.

NASA's physical sciences research activities have been guided by recommendations from the National Research Council (NRC) and U.S. Space Exploration Policy. Spacecraft fire safety and material flammability have been listed as priority areas of research by the NRC in the 2006 report: "Review of NASA Plans for the International Space Station" and in several prior NRC reports including, "Space Engineering Board and Assessment of Directions in Microgravity and Physical Sciences Research at NASA" in 2003, and the "Microgravity Research in Support of Technologies for the Human Exploration and Development of Space and Planetary Bodies", in 2000.

In order to avoid duplication of efforts please refer to the following websites to find information on current ISS experiments:
http://spaceflightsystems.grc.nasa.gov/Advanced/ISSResearch/
http://www.nasa.gov/mission_pages/station/science/experiments/Summary.html
http://www.esa.int/esaCP/index.html
http://www.jaxa.jp/index_e.html
http://www.cnes.fr/

B. Research Emphases Specific to this Solicitation

Uncontrolled fires aboard spacecraft could be devastating to international efforts to expand the human presence in space. Accordingly, NASA seeks to improve fire safety aboard spacecraft such as the Shuttle and the International Space Station. Testing to date has shown that ignition and flame spread on fuel surfaces (e.g., paper, wire insulation) behave quite differently under partial gravity and microgravity conditions than under normal gravity (King and Ross, 1998). In addition, fire signatures—i.e., heat release, smoke production, flame visibility, and radiation—are now known to be different in reduced gravity environments; this research has provided data to improve the effectiveness of fire prevention practices, smoke and fire detectors, and fire extinguishment systems. We will need to extend our scientific and technological understanding of fire behavior in microgravity and partial gravity to continue to maximize safety of those people whose lives depend on the environment aboard spacecraft and eventual Lunar and Martian habitats.

Owing to the very large density differences resulting from the hot flame environment, gravity tends to exert a controlling influence on most flame systems. As discussed in the above referenced document, the microgravity behavior of combustion systems often differs widely from normal gravity combustion. Understanding and quantifying these effects can only be achieved by a combination of well-devised long-duration microgravity experiments and mechanistic models of the fundamental processes and phenomena. It is also envisioned that microgravity data will help refine normal-gravity models by providing new insights into various competing mechanisms. NASA is, therefore, interested in supporting research in the following areas:

<u>1. Fundamental studies of material flammability as a function of gravity, flow and orientation.</u>

A fundamental understanding of the effect of configuration and the environment on material flammability underlies any effective fire safety strategy, whether it is terrestrial or space-based. Experiments conducted in space and in ground-based facilities have provided considerable data on the behavior of low and partial gravity fires and have significantly increased our understanding of low- and partial-gravity fires. See, for example, the above referenced document for a review of NASA-sponsored work through 1998. Each of the studies discussed in this article has identified new behavior and mechanisms that can impact how a fire safety strategy is developed. Proposals are sought that extend these early experiments to quantify the combined effects of gravity, flow, and configuration on fundamental flame processes in solid fuel fires including fire ignition, spread and growth.

<u>2. Investigation of the relevance of existing flammability test methods for low and partial gravity environments</u>

NASA's material flammability testing based on NASA-STD-6001.A Test 1, a normal-gravity test (Flammability, Offgassing, and Compatibility Requirements and Test

Procedures, NASA-STD-6001.A, 2008) and its preceding standards have been used since the early days of the manned space program to screen materials for use on spacecraft. However, the pass/fail criteria, i.e., whether the flame propagates a specified distance is highly gravity dependent as gravity plays a significant role in both the ignition and flame propagation phenomena associated with this test. This contributes to the probabilistic nature of the test results, especially when tests are conducted at oxygen concentrations near the pass/fail boundary for a specific material (Engle *et al*., 2003). Other factors that may play a role in this behavior include variability in the igniter position, energy output and the test material itself. Based on these results, NASA recently increased the number of test specimens required to evaluate a material from three to five to better account for this variability. Proposals are desired that develop a fundamental understanding of NASA's material flammability test, NASA-STD-6001.A Test 1, or other standard flammability tests and relate the test results to flammability in low- and partial-gravity.

3. Development and validation of test approaches for assessment of material flammability under microgravity and partial gravity conditions

Existing material flammability acceptance test methods have been in place with little revision since the early days of manned spaceflight. The criteria applied in these acceptance tests were developed more from a phenomenological basis than quantification of the risk of a fire. Microgravity testing has identified that some materials become more flammable (as evidenced by a lower limiting oxygen index) in a reduced gravity convective flow than under normal gravity conditions indicating that this test may not be conservative in all cases and for all materials. Proposals for a normal gravity test method that, either by design, analysis or both, can accurately assess material flammability in low and partial gravity levels are desired. However, acceptance criterion for this test method must be traceable to fire behavior in reduced gravity and verified in in-space tests.

4. Quantification of low-gravity gaseous and particulate products of combustion for materials used in the habitable volume of spacecraft developed in the Constellation program.

The low- and partial-gravity environment eliminates or reduces natural convection caused by a flame or overheating component. This reduces any cooling of the material due to airflow and increases the residence time of particulate and other pyrolysis products. Early detection of incipient fires greatly simplifies fire response and reduces the impact on equipment, mission, and crew. Previous experiments have been conducted in low-g to quantify changes in smoke particulate in low-gravity but additional work is necessary. Proposals are desired that quantify the impact of gravity on the composition and yield of gaseous combustion products. In the event that this research leads to a flight experiment, we expect to use the same insert developed for topics 1, 2 and 3 that may now include additional diagnostic tools to accommodate topic 4 (O'Malley *et al*., 2008).

Several documents listed below can provide background on microgravity combustion research; spacecraft fire safety environmental conditions and expected Constellation geometries. Most of these documents can be accessed at the 'Space Flight Systems

Document Repository' website hosted by NASA Glenn Research Center: http://spaceflightsystems.grc.nasa.gov/document_repository.php

1. O'Malley, Terence F., Sheredy, William A., Stocker, Dennis P., "Combustion Research On The International Space Station," 59th International Astronautical Congress, United Kingdom, Glasgow, IAC-08-A2.1.07, 2008.

2. King, M. K. and Ross, H. D. "Overview of the NASA Microgravity Combustion Program", AIAA J., 36, 8, 1998, pp 1337-45.

3. Flammability, Offgassing, and Compatibility Requirements and Test Procedures, NASA-STD-6001.A, 2008.

4. Lange, K.E., Perka, A.T., Duffield, B. E., and Jeng, F.F. "Bounding the Spacecraft Atmosphere Design Space for Future Exploration Missions," NASA CR-2005-213689, 2005.

5. Urban, D.L., Griffin, D., Ruff, G.A., Cleary, T., Yang, J. Mulholland, G., and Yuan, Z.-G., "Detection of Smoke from Microgravity Fires," SAE Paper No. 2005-01-2930, 35th International Conference on Environmental Systems and 8th European Symposium on Space Environmental Control Systems, Rome, Italy, July 2005.

6. Urban, D.L., Ruff, G.A., Mulholland, G., Cleary, T., Yang, J. and Yuan, Z.-G., "Measurement of Smoke Particle Size under Low-Gravity Conditions," SAE Paper No. 2008-01-2089, 38th International Conference on Environmental Systems, San Francisco, CA, June 2008.

7. Campbell, P.D. and Henninger, D.L. "Recommendations for Exploration Spacecraft Habitable Atmospheres," Report No. JSC-63309, January 2006.

8. Wieland, P.O., "Living Together in Space: The Design and Operation of the Life Support Systems on the International Space Station. Volume 1." NASA/TM-1998-206956/Volume 1, January 1998.

9. Wieland, P.O., "Designing for a Human Presence in Space: An Introduction to Environmental Control and Life Support Systems," NASA-RP-1324, 1994.

10. NASA/CP-2003-212376/REV1, August 2003, Seventh International Workshop on Microgravity Combustion and Chemically Reacting Systems, Proceedings of a conference sponsored by NASA Microgravity Science Division hosted by NASA Glenn Research Center Cleveland, Ohio June 3-6, 2003.

11. NASA/CP-2004-213205/VOL1, August 2004, Strategic Research to Enable NASA's Exploration Missions Conference and Workshop, Proceedings of a conference held at and sponsored by the NASA Office of Biological and Physical Research and hosted

by NASA Glenn Research Center and the National Center for Microgravity Research on Fluids and Combustion Cleveland, Ohio, June 22-23, 2004.

12. Ruff, G. A. (ed.), Research Needs in Fire Safety for the Human Exploration and Utilization of Space: Proceedings and Research Plan, NASA CP-2003-212103, April 2003.

13. Ruff, G.A. and Urban, D.L. "Technology Development for Fire Safety in Exploration Spacecraft and Habitats," AIAA-2007-0350, 45th Aerospace Sciences Meeting and Exhibit, Reno, NV, January 2007.

14. Engel, Carl D., Samuel E. Davis, and Erin Richardson, Upward Flammability Testing - A Probabilistic Measurement, Flammability and Sensitivity of Oxygen-Enriched Atmospheres, T. A. Steinberg, B. E. Newton, and H. D. Beeson, eds., ASTM Tenth Volume, STP-1454, 2003.

Additional general information on NASA Constellation program is available at the website: http://www.nasa.gov/mission_pages/constellation/main/index.html

C. NASA Safety Policy

Safety is NASA's highest priority. Safety is the freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. NASA's safety priority is to protect: (1) the public, (2), the NASA workforce (including astronauts, pilots and employees working under NASA instruments), and (3) high-value equipment and property. All research conducted under NASA shall conform to this philosophy.

D. Availability of NASA Funds for Award

The Government's obligation to make award(s) is contingent upon the availability of the appropriated funds from which payment can be made and the receipt of proposals that are determined acceptable for NASA award under this NRA.

E. Additional Funding Restrictions

The construction of facilities is not an allowed activity unless specifically stated so in the program description. For further information on the allowable costs, refer to the cost principles cited in the *NASA Federal Acquisition Regulations (FAR) Supplement Provision* and the *Guidebook for Proposers*.

Travel, including foreign travel, is allowed as may be necessary for the meaningful completion of the proposed investigation, as well as for presenting results at an appropriate professional meeting. See Section VI, Part D for required travel information.

Profit for commercial organizations is allowed under contract awards only.

Regardless of whether functioning as a PI or as a team member, personnel from NASA Centers must propose budgets based on Full Cost Accounting (FCA). Non-NASA U.S. Government organizations should propose based on FCA unless no such standards are in effect; in that case such proposers should follow the Managerial Cost Accounting Standards for the Federal Government, as recommended by the Federal Accounting Standards Advisory Board. For further information, see http://www.hq.nasa.gov/fullcost/.

II. Award Information

The selected proposal(s) are expected to be funded for activities lasting up to three years. The mechanism for funding each successful proposal will be a single grant, with funding allocations to participating investigators based on the submitted budget, available funds and overall project review. The funding duration will depend on proposal requirements, peer review panel recommendations, and continuing progress of the activity. Proposals will be evaluated as described in Section V. Proposals to continue or supplement existing grants, if selected, will result in a new grant.

Depending on available funding, the award for each selected proposal will average $120,000/year for a total award amount of $360,000. It is anticipated that up to four investigations will be selected. NASA does not provide separate funding for direct and indirect costs; thus, the amount of the award requested is the total of all costs submitted in the proposed budget. Selection of proposals are planned to be announced in December 2009, and the grant will be awarded in a reasonable timeframe thereafter.

III. Eligibility Information

A. Eligibility of Applicants

All categories of U.S. institutions are eligible to submit proposals in response to this NRA. Principal Investigators (PIs) may collaborate with investigators from universities, Federal Government laboratories, the private sector, state and local government laboratories and other countries. In all such arrangements, the applying entity is expected to be responsible for administering the project according to the management approach presented in the proposal. The applying entity must have in place a documented base of ongoing high quality research in science and technology, or in those areas of science and engineering clearly relevant to the specific programmatic objectives and research emphases indicated in this NRA. Present or prior NASA support of research or training in any institution or for any investigator is not a prerequisite for submission of a proposal.

B. Guidelines for International Participation

NASA welcomes proposals from outside the U.S. However, foreign entities are generally not eligible for funding from NASA. Therefore, unless otherwise noted in the NRA, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration with a U.S. institution, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed. All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the NRA. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received on or before the established closing date. Those received after the closing date will be treated in accordance with: Appendix A, paragraph (G). Sponsoring foreign government agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected. Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations (OER) will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities. Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

(i) An exchange of letters between NASA and the foreign sponsor; or
(ii) A formal Agency-to-Agency Memorandum of Understanding (MOU).

NASA's policy is to conduct research with non-U.S. organizations on a cooperative, no exchange-of-funds basis. Although Co-Investigators or collaborators employed by non-U.S. organizations may be identified as part of a proposal submitted by a U.S. organization, NASA funding through this NRA may not be used to support research efforts by non-U.S. organizations at any level; however, the direct purchase of supplies and/or services that do not constitute research from non-U.S. sources by U.S. award recipients is permitted. See NASA FAR Supplement Part 1835.016-70 for additional information on international participation, which can be referenced at http://www.hq.nasa.gov/office/procurement/regs/1835.htm#35_016-70.
Also see NASA Policy Directive 1360.2 Initiation and Development of International Cooperation in Space and Aeronautics Programs, which is located at http://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal_ID=N_PD_1360_002A_&page_name=main

C. Export Control Guidelines Applicable to Proposals Including Foreign Participation

Foreign proposals and proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations, e.g., 22 CFR Parts 120-130 and 15 CFR Parts 730-774, as applicable to the circumstances surrounding the particular foreign participation. The discussion must describe in detail the proposed foreign participation and is to include, but not be limited to, whether or not the foreign participation may require the prospective Proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available at the U.S. Department of State Web site http://www.pmddtc.state.gov and through the U.S. Department of Commerce's Bureau of Industry and Security Web site at http://www.bis.doc.gov. Proposers are advised that under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130.

Because of these legal provisions and requirements, Proposers and institutions whose proposals involve non-U.S. participants should be aware that such participation can add to management complexity and risk, and, therefore, Proposers should limit such cooperative arrangements to those offering significant benefits while maintaining the clearest and simplest possible technical and management interfaces.

Export-Controlled Material in Proposals

While explicit inclusion of export-controlled material in proposals is not prohibited, NASA is advising proposers that, under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130. Other items or information may be subject to the Export Administration Regulations (EAR), 15 CFR Parts 730 – 774. This may, in some circumstances, complicate NASA's ability to evaluate the proposal, since occasionally NASA may use the services of foreign nationals who are neither U.S. citizens nor lawful permanent residents of the U.S. to review proposals submitted in response to this NRA.

Proposers to NRAs are strongly encouraged not to include export-controlled material in their proposals, although the effort being proposed may itself be export controlled (ref. Web sites noted above in 1.6.2(a)). If it is essential to include any export-controlled information in a proposal, a notice to that effect must be prominently displayed on the first pages of the proposal and shall state:

"The information (data) contained in [insert page numbers or other identification] of this proposal is (are) subject to U.S. export control laws and regulations. It is furnished to the Government with the understanding that it will not be exported without the prior approval of the Proposer under the terms of an applicable export license or technical assistance agreement."

Reference the following URL for guidance on NASA's Export Control Program and NASA Center Points of Contact:

http://www.hq.nasa.gov/office/oer/nasaecp/contacts.html

For the purposes of proposals submitted via NSPIRES, these first pages listing export-controlled information should precede the table of contents, do not count against the page limits, and may also be used to provide the proprietary notification, if applicable. Note that it is the responsibility of the Proposer to determine whether any proposal information is subject to export-control regulations.

D. Cost Sharing or Matching

If an institution of higher education, hospital, or other non-profit organization wants to receive a grant from NASA, cost sharing is not required. However, NASA can accept cost sharing if it is voluntarily offered. If a commercial organization wants to receive a grant, cost sharing is required unless the commercial organization can demonstrate that they are unlikely to receive substantial compensating benefits for performance of the work. If no substantial compensating benefits are likely to be received, then cost sharing is not required but can be accepted. Acceptable forms of cost sharing are located at http://www.hq.nasa.gov/office/procurement/regs/1816.doc#OLE_LINK3.

IV. Proposal and Submission Information

A. Source of Application Materials

Except where specifically stated otherwise in this NRA, applicants must prepare proposals in accordance with the "Instructions for Responding to NASA Research Announcements" NASA Federal Acquisition Regulations (FAR) Supplement (NFS), Part 1852.235-72 (http://www.hq.nasa.gov/office/procurement/regs/5228-41.htm#52_235-72). These instructions hereafter referred to as the *NASA FAR Supplement Provision*, can be referenced in its entirety in Appendix A of this document.

All information needed to submit an electronic proposal in response to this solicitation is contained in this NRA and in the 2009 version of the companion document entitled "Guidebook for Proposers Responding to a NASA Research Announcement (NRA)"

(hereafter referred to as the *Guidebook for Proposers*) that is located at http://www.hq.nasa.gov/office/procurement/nraguidebook/.

At NASA's discretion, proposals that do not conform to these standards and directions given in this NRA may be declared noncompliant and declined without review.

Proposal submission questions will be answered and published in a Frequently Asked Questions (FAQ) document. This FAQ will be posted on the NSPIRES solicitation download site alongside this NRA, and will be updated periodically between submission release and the proposal due date.

B. Content and Form of NOI and Proposal Submission

1. NASA Proposal Data System

a) NSPIRES Registration

This NRA requires that the proposer register key data concerning their intended submission with the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES) located at http://nspires.nasaprs.com. Potential applicants are urged to access this site well in advance of the NOI and proposal due dates to familiarize themselves with its structure and enter the requested identifier information**. It is especially important to note that every individual named on the proposal's *Cover Page* (see further below) must be registered in NSPIRES and that such individuals must perform this registration themselves; that is, no one may register a second party, even the PI of a proposal.** This data site is secure and all information entered is strictly for NASA use only.

Every organization that intends to submit a proposal in response to this NRA, including educational institutions, industry, nonprofit institutions, NASA Centers, the Jet Propulsion Laboratory, and other U.S. Government agencies, **must be registered in NSPIRES**, regardless of the electronic system used to submit proposals. Such registration must be performed by an organization's electronic business point-of-contact (EBPOC) in the Central Contractor Registry (CCR).

b) Notice of Intent Submission

To facilitate planning for the review process, applicants are strongly encouraged to submit a NOI through NSPIRES by following the online instructions. **Notices of Intent must be electronically submitted by June 18, 2009**, through the NSPIRES website (http://nspires.nasaprs.com).

To initiate a NOI:

- Log in using your NSPIRES user name and password.
- Access Proposals in the NSPIRES Options Page

- Click on the "Create NOI" button in the upper right hand corner of the screen.
- Select the "Research Opportunities for Combustion Science" (NNH09ZTT001N) solicitation.
- Follow the step-by-step instructions provided in NSPIRES to complete your Step-1 proposal.

Please refer to the NSPIRES tutorials at http://nspires.nasaprs.com/tutorials/index.html for on-line help. All information entered will remain private until the electronic submission is completed. Please note that Notices of Intent are strongly encouraged, but are not required for submission of a proposal. Failure to submit a Notice of Intent will not impact the selection process.

c) Proposal submission

Proposals are due August 18, 2009. All proposals must meet the requirements for responding to an NRA as outlined in the *NASA FAR Supplement Provision* (Appendix A). Chapter 2 of the *Guidebook for Proposers* provides detailed discussions of the content and organization of proposals for electronic submission.

Proposals must be submitted electronically by one of the officials at the PI's organization who is authorized to make such a submission. Proposers intending to submit proposals must use NSPIRES (http://nspires.nasaprs.com) for proposal submission**.**

It is strongly recommended that the PI work closely with his/her organization official to ensure the proposal is submitted by the due date and time listed in this solicitation. Proposals will not be accepted after the listed due date and time.

NSPIRES accepts electronic proposals through a combination of data-based information (*e.g.*, the electronic *Cover Page* and its associated forms) and an uploaded PDF file that contains the body of the proposal. The web site will provide a list of all elements that make up an electronic proposal, and the system will conduct an element check to identify any item(s) that is (are) apparently missing or incomplete. The NSPIRES proposal submission process ensures that a minimum set of required proposal cover page fields are completed. Provision of the proposal summary and business data elements of the cover page will be necessary in order for the AOR to submit the proposal to NASA. If either of these two proposal elements are not completed, the "View Proposal/ Check Elements" function of NSPIRES will display red "error" flags and messages to alert the user to the information that is required but missing, and the "Submit Proposal" button will not be available. Although the PI will be able to release the proposal to the AOR, the proposal cannot be submitted by the AOR to NASA until these required fields are complete. Any additional information that is missing will be identified by yellow "warning" flags. In addition, proposers are reminded to check the solicitation instructions to ensure compliance with all instructions, as adherence to these two element validation checks alone is insufficient to guarantee a compliant proposal. Additionally, in those cases where instruction(s) in the NRA contradicts an NSPIRES warning, the NSPIRES "warning" may be ignored. Proposers should follow the NRA instructions closely to help ensure

submission of a compliant proposal. Proposers are particularly encouraged to begin their submission process early.

Requests for assistance in accessing and/or using the NSPIRES website should be submitted by E-mail to nspires-help@nasaprs.com or by telephone to (202) 479-9376 Monday through Friday, 8:00 AM – 6:00 PM Eastern Time. FAQs may be accessed through the Proposal Online Help site at http://nspires.nasaprs.com/external/help.do. Tutorials of NSPIRES are available at http://nspires.nasaprs.com/tutorials/index.html.

The NSPIRES system will guide proposers through submission of all required proposal information. Select the NOI button on the Create Proposal screen on NSPIRES to create a proposal from a previously submitted NOI. Information from your NOI will be automatically transferred to your proposal. Please note that the Proposal Summary, Business Data, Budget, and Proposal Team are required Cover Page Elements. The proposal summary should be between 100-300 words and understandable by the layman reader.

NSPIRES allows for the upload of several proposal components as individual documents. However, to ensure proper proposal transmission, please provide only **one** PDF attachment upload ordered as follows:

1. *Scientific / Technical Project Description (see section IV.B.1.c.1)*
2. *References and Citations*
3. *Management Approach (see Guidebook for Proposers & Appendix A)*
4. *Personnel CVs (see Guidebook for Proposers & Appendix A)*
5. *Facilities and Equipment (see Guidebook for Proposers & Appendix A)*
6. *Budget Justification (see Guidebook for Proposers & Appendix A)*
7. *Letters of Collaboration / Support (see Guidebook for Proposers & Appendix A)*
8. *Reprints and Appendices (see IV.B.1.c.2)*

The PDF upload must not be password protected or locked in any way. Proposals are prepared by the PI or a designated representative of the PI but are submitted by an official of the PI's organization after the PI has released the prepared proposal to the institution official.

The following supersedes the information provided in the *Guidebook for Proposers* and is required in addition to the *NASA FAR Supplement Provision* (Appendix A)*:*

1) Scientific/Technical/Management Section (Project Description)

The length of the project description of the proposal cannot exceed 20 pages using standard (12 point) type. Text should have the following margins: left = 1.5"; Right, top, bottom = 1.0". Referenced figures must be included in the 20 pages of the project description; however figure captions can use a 10 point font. The proposal should contain sufficient detail to enable reviewers to make informed judgments about the overall merit of the proposed research and about the probability that the proposers will be able to accomplish their stated objectives with current resources and the resources

requested. The hypotheses and specific aims of the proposed research must be clearly stated. **Proposals that exceed the 20-page limit for the project description will be declined without review. Cited literature and other proposal sections are not considered part of the 20-page project description.** Reviewers are not required to consider information presented as appendices or to view and/or consider Web links in their evaluation of the proposal. Additional information can be referenced in Appendix A, Section (c)(4).

2) Reprints and Appendices

Reprints and Appendices, if any, do not count toward the project description page limit, and are to be included following all other sections of the proposal (reviewers are not required to consider information presented in appendices).

C. Submission Dates

For Solicitation announcement identifier NRA **NNH09ZTT001N**:

Notices of Intent are due June 18, 2009, 11:59 PM Eastern Time

Proposals are due August 18, 2009, 11:59 PM Eastern Time.

The estimated selection announcement date is December 2009. The NASA Selecting Official is the Director of the Advanced Capabilities Division, Exploration Systems Mission Directorate at NASA Headquarters (Washington, D.C.).

V. Proposal Evaluation Process

The overall evaluation process for proposals submitted in response to this NRA will include a Compliance Matrix Review and an Intrinsic Scientific or Technical Merit Review. Proposals most highly rated in the merit review process will undergo a NASA relevance, programmatic balance and cost review.

A. Compliance Review

All proposals must comply with the general requirements of the NRA as described in this solicitation, the *Guidebook for Proposers*, and the *NASA FAR Supplement Provision*. Upon receipt, proposals will be reviewed for compliance with these requirements including:

1) The proposal project description must be no more than 20 pages in length.
2) Submission of an appropriate and justified budget for a funding period not exceeding that described in the NRA.

3) Submission of all other appropriate information as required by this NRA.

At NASA's discretion, non-compliant proposals may be withdrawn from the review process and declined without further review. Compliant proposals submitted in response to this NRA will undergo an intrinsic scientific or technical merit review.

B. Intrinsic Scientific or Technical Merit Review and Evaluation Criteria

Compliant proposals will undergo a merit peer review by a panel of scientific and/or technical subject matter experts. This panel of experts may include non-NASA and or non-Government personnel. The number and diversity of experts required will be determined by the response to this NRA and by the variety of disciplines represented in the proposals relevant to the research emphases described in this NRA. The merit review panel will assign ***a score from 0-100*** based upon the intrinsic scientific or technical merit of the proposal. This score will reflect the consensus of the panel which is based on the proposal's strengths and weaknesses.

The peer review panel may include in their critique of a proposal any comments they may have concerning the proposal's budget and programmatic relevance to NASA, however, the panel's scientific or technical merit score will not be impacted by the cost of the proposal work, nor will the panel's scientific or technical merit score reflect the programmatic relevance of the proposed work to NASA.

To be responsive to this research solicitation, proposed studies should be hypothesis-driven and lead to new knowledge within accepted scientific standards. Purely phenomenological approaches with no significant mechanistic basis or likely gain in scientific knowledge are not acceptable.

All of the following criteria will be used in determining the merit score (significance and approach are the most important and weigh more than innovation, investigator, and environment):

- **Significance:** Does this study address an important problem? If the aims of the application are achieved, how will scientific knowledge or technology be advanced? What will be the effect of these studies on the concepts, methods, or products that drive this field? Is there a significant societal or economic impact?
- **Approach:** Are the conceptual framework, design, methods, and analyses adequately developed, well integrated, and appropriate to the aims of the project? Is the proposed approach likely to yield the desired results? Does the applicant acknowledge potential problem areas and consider alternative tactics?
- **Innovation:** Does the project employ appropriate novel concepts, approaches, or methods? Does the project challenge existing paradigms or develop new methodologies or technologies?
- **Investigators:** Are the proposers appropriately trained and well suited to carry out this work? Is the work proposed appropriate to the experience level of the principal investigator and any co-investigators? Is the evidence of the proposers'

productivity satisfactory?

- **Environment:** Does the scientific environment in which the work will be performed contribute to the probability of success? Do the proposed experiments take advantage of unique features of the scientific environment or employ useful collaborative arrangements? Is there evidence of institutional support?

C. NASA Relevance, Programmatic Balance and Cost Review

Only those proposals most highly rated in the merit review process will undergo additional review. This review will evaluate the relevancy to NASA's Exploration Technology Development Program (ETDP), programmatic balance and cost. This review will be conducted by NASA ETDP Program Scientists and Managers. Evaluation of the cost of a proposed effort includes consideration of the realism and reasonableness of the proposed cost and the relationship of the proposed cost to available funds. The NASA relevance and programmatic balance review will evaluate how these highly rated proposals help achieve an appropriate balance between fundamental research and exploration relevant applied research. This review will also evaluate how the proposed work addresses critical tasks identified by EDTP or previous NRC reports.

D. Selection

The information resulting from the reviews described above will be used to prepare selection recommendations by NASA Program Scientists and Managers in coordination with the NASA Headquarters Program Executive. Selection for funding will be made by the designated NASA Selecting Official (the Director of Advanced Capabilities Division, Exploration Systems Mission Directorate [ESMD] at NASA Headquarters).

The most important element in the evaluation process is the merit review, which carries the highest weight in final evaluation and selection. Programmatic balance and cost are approximately equal in weight to each other. Deficiencies in any one of these factors may prevent selection of a proposal. Additional information can be referenced in Appendix A, Section (k).

E. Ombudsman

(1) An ombudsman has been appointed to hear and facilitate the resolution of concerns from offerors, potential offerors, and contractors during the preaward and postaward phases of this acquisition. When requested, the ombudsman will maintain strict confidentiality as to the source of the concern. The existence of the ombudsman is not to diminish the authority of the contracting officer, the Proposal Evaluation Panel, or the selection official. Further, the ombudsman does not participate in the evaluation of proposals, the source selection process, or the adjudication of formal contract disputes. Therefore, before consulting with an ombudsman, interested parties must first address

their concerns, issues, disagreements, and/or recommendations to the contracting officer for resolution.

(2) If resolution cannot be made by the contracting officer, interested parties may contact the NASA ombudsman. Concerns, issues, disagreements, and recommendations which cannot be resolved at the installation may be referred to the NASA ombudsman, James A. Balinskas, the Director of the Contract Management Division, at 202-358-0445, fax 202-358-3083, email james.a.balinskas@nasa.gov. Please do not contact the ombudsman to request copies of the solicitation, verify due date, or clarify technical requirements. Such inquiries shall be directed to the contacts specified in Section VII of this document.

VI. Award Administration Information

A. Award Notices

At the end of the selection process, each proposing organization will be notified of its selection or non-selection status. NASA will provide debriefings to those proposers who request one. Selection notification will be made electronically through NSPIRES and by a letter signed by the selecting official. The selection letters are not an authorization to begin performance. The selected organization's business office will be contacted by a NASA Grant Officer to negotiate an award. Any costs incurred by the proposer in anticipation of an award are at their own risk until contacted by a NASA Grant Officer. The NASA Procurement Office will determine the type of award instrument, request further business data, and negotiate the resultant action. NASA Grant Officers are the only personnel with the authority to award NASA grants and obligate government funds. NASA reserves the right to offer selection of only a portion of a proposal. In these instances, the proposer will be given the opportunity to accept or decline the offer. Additional information can be referenced in Appendix A, Section (k)(2).

B. Administrative and National Policy Requirements

All grant awards are subject to the NASA Grant and Cooperative Agreement Handbook (NPR 5800.1). This handbook consists of four sections that prescribe the policies and procedures relating to the award and administration of NASA grants. Section A provides the text of provisions and special conditions and addresses NASA's authority, definitions, applicability, amendments, publications, deviations, pre-award requirements and post-award requirements currently covered by 14 CFR Part 1260. Section B relates to grants with institutions of higher education, hospitals, and other nonprofit organizations. Sections A and B, with the special considerations in subpart 1260.4(b), apply to awards with commercial firms that do not involve cost sharing. Section C adopts the administrative requirements of OMB Circular No. A-102 and relates to administrative requirements for grants to state and local governments. Section D relates to awards with commercial firms. The Handbook is located at http://ec.msfc.nasa.gov/hq/grcover.htm.

C. Program Reporting/Individual Researcher Reporting

Annual Reporting and Task Book Reporting
The PI shall provide an annual written report to NASA on or before the anniversary of the start of funding. This information will be used to assess the degree of progress of the project. A component of this annual report will be used for the NASA Task Book (http://taskbook.nasaprs.com). The Task Book includes descriptions of all peer-reviewed research activities funded by the ESMD Advanced Capabilities Division disciplines such as Physical Sciences, Fundamental Space Biology and Human Research.

This information will consist primarily of:

- An abstract
- A bibliographic list of publications
- Copies of publications
- A statement of progress, including a comparison with the originally proposed work schedule

Final Report
A final report must be provided to NASA at the end of the award funding period, including a detailed listing of all peer-reviewed publications. This information will consist primarily of:

- Statement of the specific objectives
- Significance of the work
- Background
- Overall progress during the performance period
- Narrative discussion of technical approaches including problems encountered
- Accomplishments related to approach
- An appendix with bibliography and copies of all publications and reports

Any publications or other public materials containing data are particularly important to include in this section.

D. Other Considerations

Optional Travel
Any travel for presentation at a professional society meeting (highly desirable).

VII. Contacts

Additional technical information for the NASA Combustion Science NRA is available from:

Dr. Francis Chiaramonte
Program Executive
NASA Headquarters
Email: francis.p.chiaramonte@nasa.gov
Phone: 202-358-0693

Additional NASA contracting information for this NRA is available from:

Cassandra Williams
Contract Specialist
NASA Shared Services Center
Email: cassandra.williams@nasa.gov
Phone: 228-813-6271

VIII. References

1. Guidebook For Proposers Responding To A NASA Research Announcement (NRA), January 2009 Edition. This document is available online at the following address: http://www.hq.nasa.gov/office/procurement/nraguidebook/

2. NASA Task Book. This document is available online at the following address: http://taskbook.nasaprs.com/

3. NASA Federal Acquisition Regulations Supplement. This document is available online at the following address: http://www.hq.nasa.gov/office/procurement/regs/nfstocA.htm

4. NASA Grant and Cooperative Agreement Handbook. This document is available online at the following address: http://ec.msfc.nasa.gov/hq/grcover.htm

5. Microgravity Research in Support of Technologies for the Human Exploration and Development of Space and Planetary Bodies, Committee on Microgravity Research, National Academy Press, 2000.

6. Microgravity Combustion: Fire in Free Fall, Howard D. Ross, 2001, Academic Press, San Diego.

7. O'Malley, Terence F., Sheredy, William A., Stocker , Dennis P., "Combustion Research On The International Space Station," 59th International Astronautical Congress, United Kingdom, Glasgow, IAC-08-A2.1.07, 2008.

8. King, M. K. and Ross, H. D. "Overview of the NASA Microgravity Combustion Program", AIAA J., 36, 8, 1998, pp 1337-45.

9. Flammability, Offgassing, and Compatibility Requirements and Test Procedures, NASA-STD-6001.A, 2008.

10. Lange, K.E., Perka, A.T., Duffield, B. E., and Jeng, F.F. "Bounding the Spacecraft Atmosphere Design Space for Future Exploration Missions," NASA CR-2005-213689, 2005.

11. Urban, D.L., Griffin, D., Ruff, G.A., Cleary, T., Yang, J. Mulholland, G., and Yuan, Z.-G., "Detection of Smoke from Microgravity Fires," SAE Paper No. 2005-01-2930, 35th International Conference on Environmental Systems and 8th European Symposium on Space Environmental Control Systems, Rome, Italy, July 2005.

12. Urban, D.L., Ruff, G.A., Mulholland, G., Cleary, T., Yang, J. and Yuan, Z.-G., "Measurement of Smoke Particle Size under Low-Gravity Conditions," SAE Paper No. 2008-01-2089, 38th International Conference on Environmental Systems, San Francisco, CA, June 2008.

13. Campbell, P.D. and Henninger, D.L. "Recommendations for Exploration Spacecraft Habitable Atmospheres," Report No. JSC-63309, January 2006.

14. Wieland, P.O., "Living Together in Space: The Design and Operation of the Life Support Systems on the International Space Station. Volume 1." NASA/TM-1998-206956/Volume 1, January 1998.

15. Wieland, P.O., "Designing for a Human Presence in Space: An Introduction to Environmental Control and Life Support Systems," NASA-RP-1324, 1994.

16. NASA/CP-2003-212376/REV1, August 2003, Seventh International Workshop on Microgravity Combustion and Chemically Reacting Systems, Proceedings of a conference sponsored by NASA Microgravity Science Division hosted by NASA Glenn Research Center Cleveland, Ohio June 3-6, 2003

17. NASA/CP-2004-213205/VOL1, August 2004, Strategic Research to Enable NASA's Exploration Missions Conference and Workshop, Proceedings of a conference held at and sponsored by the NASA Office of Biological and Physical Research and hosted by NASA Glenn Research Center and the National Center for Microgravity Research on Fluids and Combustion Cleveland, Ohio, June 22-23, 2004.

18. Ruff, G. A. (ed.), Research Needs in Fire Safety for the Human Exploration and Utilization of Space: Proceedings and Research Plan, NASA CP-2003-212103, April 2003.

19. Ruff, G.A. and Urban, D.L. "Technology Development for Fire Safety in Exploration Spacecraft and Habitats," AIAA-2007-0350, 45th Aerospace Sciences Meeting and Exhibit, Reno, NV, January 2007.

20. Engel, Carl D., Samuel E. Davis, and Erin Richardson, Upward Flammability Testing - A Probabilistic Measurement, Flammability and Sensitivity of Oxygen-Enriched Atmospheres, T. A. Steinberg, B. E. Newton, and H. D. Beeson, eds., ASTM Tenth Volume, STP-1454, 2003.

21. General information about the NASA Constellation program is available at the website: http://www.nasa.gov/mission_pages/constellation/main/index.html

Appendix A: Instructions for Responding to NASA Research Announcements

(NASA FAR Supplement 1852.2325-72, November 2004)

(A) **General.**

(1) Proposals received in response to a NASA NRA will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRAs contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRAs.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate award instrument. Contracts resulting from NRAs are subject to the FAR and the NASA FAR Supplement. Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPR 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposer's most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

(B) **NRA-Specific Items**. Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more

information. Items included in these instructions may be supplemented by the NRA.

(C) The following information is needed to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) **Transmittal Letter or Prefatory Material.**

(i) The legal name and address of the organization and specific division or campus identification if part of a larger organization;

(ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;

(iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;

(iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;

(v) Identification of other organizations that are currently evaluating a proposal for the same efforts;

(vi) Identification of the NRA, by number and title, to which the proposal is responding;

(vii) Dollar amount requested, desired starting date, and duration of project;

(viii) Date of submission; and

(ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

(2) **Restriction on Use and Disclosure of Proposal Information.** Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

Notice
Restriction on Use and Disclosure of Proposal Information

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) **Abstract.** Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) **Project Description.**

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) **Management Approach**. For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) **Personnel.** The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical

information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) **Facilities and Equipment**.

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that is proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

(8) **Proposed Costs (U.S. Proposals Only).**

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(iv) Use of NASA funds--NASA funding may not be used for foreign research efforts at any level, whether as a collaborator

or a subcontract. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted. Additionally, in accordance with the National Space Transportation Policy, use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis.

(9) **Security**. Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) **Current Support.** For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) **Special Matters.**

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(ii) Identify and discuss risk factors and issues throughout the proposal where they are relevant, and your approach to managing these risks.

(iii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

(D) **Renewal Proposals.**

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

(E) **Length.** Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

(F) **Joint Proposals.**

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

(G) **Late Proposals.** Proposals or proposal modifications received after the latest date specified for receipt may be considered if a significant reduction in cost to the Government is probable or if there are significant technical advantages, as compared with proposals previously received.

(H) **Withdrawal.** Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

(I) **Evaluation Factors.**

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(1) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

(J) **Evaluation Techniques.** Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are

regularly used within NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

(K) **Selection for Award.**

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

(L) **Additional Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

(1) NASA welcomes proposals from outside the U.S. However, foreign entities are generally not eligible for funding from NASA. Therefore, unless otherwise noted in the NRA, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration with a U.S. institution, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

(2) All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the NRA. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date. Those received after the closing date will be treated in accordance with paragraph (g) of this provision. Sponsoring foreign government agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected.

(3) Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities.

(4) Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

(i) An exchange of letters between NASA and the foreign sponsor; or

(ii) A formal Agency-to-Agency Memorandum of Understanding (MOU).

(M) **Cancellation of NRA.** NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.